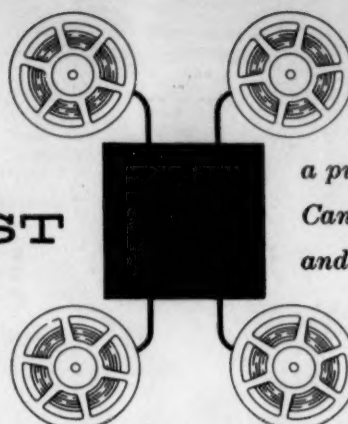


DATA PROCESSING DIGEST

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Programing

GUIDEPOSTS FOR SYSTEM DESIGN

Sherman C. Blumenthal, Chesapeake and Ohio Railway Co., Cleveland
UNIVAC REVIEW, Spring 1958; pages 8-11.

UNIVERSITY
OF MICHIGAN

OCT 2 1958

BUSINESS ADMINISTRATION
LIBRARY

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"Medium-size information systems contain from 50 to 100 separate runs or discrete passes of tape files through a computer ... More ambitious applications await... the introduction of capable analytic tools to aid in bridging the gap between problem definition and the synthesis of an automated system for its solution."

System testing would be routine if we were not limited in our ability to uncover all the implications in our system design before we reach the "checking out" stage. We need to organize the information-system testing activity to discover errors as economically as possible, and we need to reduce the probability of certain kinds of errors occurring. Errors can result from any of these sources: Incorrect input, errors in logic, clerical or coding errors in the program, operating errors, and limited coverage of problems, overloading, and inflexibility. "If the basic system design is sound and flexible, these can be eliminated or ameliorated at a reasonable cost... without any fundamental alteration in the process...."

Testing occurs on two levels--run debugging and system debugging. "Almost always, synthetic data prepared by the programmer is used in checking out his own routine. This synthetic data may be generated by a special routine if its structure is not too complex, but just as often it is handmade. Field simulation is usually employed, and the data is assembled, insofar as possible, to reflect expected variations in type of information. The presumption is that this will check every line of coding at least once, i.e., all possible paths on the flow chart. Since this is done according to the programmer's concept of the run, its usefulness may be impaired unless this activity is carefully supervised by the chief programmer or systems analyst. Not only should the latter be acquainted with and approve the design of this data, but he should also check the output resulting from its use for conformity with expected results."

When a full system is being tested, the limited utility of synthetic data is even more apparent. Actual data is usually used, as a matter of convenience.

"During the initial phase of system testing, low-volume data is employed for two reasons: to conserve machine time... and to reduce the amount of effort required for the system-testing staff to inspect outputs at various points.

"Low-volume testing should serve to get the system in shape for the extensive and crucial testing to come later by testing housekeeping between runs, testing the run-to-run integration and consistency of data requirements, detecting gross or high-level errors.

*Find faulty runs
by desk analysis*

"At this juncture, the emphasis should be on getting the system, or a piece of it, to run from top to bottom successfully." If the end products contain errors, efforts should be made first by desk analysis to identify the run or runs responsible.

A medium-volume test is made next. This is still concerned primarily with the computer portions of the system, in the run-to-run integration, but on a more detailed level.

File creation and maintenance require special testing. The "burden of error detection in the preparation of input to the file creation and maintenance is properly a computer function. Therefore, file maintenance should have special checks, both as a built-in and as a peripheral feature. All possible auditing devices, many of which may not be economical to preserve in regular production, should be used in the computer program to detect errors before forwarding the initial input to file creation and maintenance proper.... It is usually very important not to build into the system the requirement that all or any input errors be rectified before further processing of non-error items may proceed."

Computer time may be minimized during system testing by strict adherence to good debugging practices, by having runs adequately debugged, and by having the programmers within easy reach.

*Keep a record of all
corrections*

A chronological record of all corrections made should be kept in the run book with date and initials, and the old instructions should be lined out but not obliterated.

"The temptation to analyze errors on the computer should be resisted when possible...."

Two examples of "superficially knotty errors, discovered quickly by desk analysis" are given:

"A system is run in two sections, wherein the outputs of several frequently run cycles are merged and serve as input to an infrequently run cycle. The first run of the latter cycle almost

Examples of errors

immediately deteriorates to an endless loop. Examination near the beginning of the input discloses a single item out of sequence. Sequence testing shows this mis-sequencing never recurs beyond this point. The beginning of each of the several outputs of the frequently run cycle are examined, and it is found that the first item of one of them is out of sequence. The item is a special case and should have been processed in a subroutine in one of the previous runs to delete a portion of its key and transfer it to another part of the item. Had this been done, the actual sequence of the item would have been reflected by its key. It is noticed that similar items elsewhere were properly handled. The unique feature in this case is that this item was the first occurrence of this special case in the first position on tape during the testing to date. This is really a hypothesis made to account for the success of previous tests of this part of the system. The assumption led to an examination of the initial setting of a variable connector in the run supposed to have modified the key of the item. It was found a correction had been made to a part of the run, but that the initial setting of this connector had not been altered--an oversight. It was not properly set until the first item was passed in the start routine. The hypothesis led directly to the cause of the error.

The second example concerns the random and infrequent occurrence of incorrect but reasonable-looking numbers in a certain field of one of the terminal outputs. They were not constructible in any way from the number that should have been there, nor from other numbers nearby, by any algorithm. However, the kinds of transactions on which these errors occurred seemed to have something in common, even though all the transactions of these kinds did not contain the error. Special cases of these kinds of transactions, but not these, were dispersed for special processing at a far-previous point in the system. At a point in this prior branching, information from another source is inserted in some of the items. A similar procedure takes place in the main branch from which the outputs in error finally resulted. Scanning of this other source of information revealed that it contained the numbers in question, and recapitulation led to the conclusion that it was erroneously introduced into the wrong branch. This could only have happened by deliberately ignoring an incorrect tape identification check made by the computer. This is often done during system testing; hence, it should be emphasized always to check labels first to ascertain that this is the tape with the 'correct' non-checking label before supervisory control intervention."

Good testing procedures

Some other suggestions for good testing procedures are given:

1. "Service routines should be carefully studied and extensively employed.
2. Don't use large volumes until ready.
3. Don't over-commit yourself by promising results

that can only be delivered with the aid of continuous good fortune.

4. Provide yourself and those associated with you in the test with complete, compact, and easily usable operating instructions and procedures.
5. When using the computer, plan activity beforehand.
6. Put all instructions on one tape with housekeeping.
7. Keep the latest, plus at least one previous copy, of all files, correction or change tapes, and instruction tapes.
8. Get off the computer when in trouble, but only when you have secured memory dumps and printouts of inputs and outputs.
9. When appropriate code "one-shot" subroutines into a run to stop at a specific "bad" item, and then trace it one instruction at a time.
10. Leave in plenty of program breakpoints and unused storage after debugging.
11. Analyze why time wasted.

FLOW-MATIC

COMPUTING NEWS, September 1, 1958; pages 11-14.

A short description of the Univac II Flow-Matic programming system is given. A sample problem on applying prices to inventory shows how the system works. Flow-Matic is a compiler for business problems. "Both the manner and the extent to which the Flow-Matic system is used depend on the individual who uses it. The expert programmer may use the Flow-Matic procedure during the initial definition of Univac runs to facilitate communication between the computer programming group and operating management. . . The systems and procedures analysts, the accountants, operating management can use the Univac Flow-Matic system with little training. Familiarity with detailed computer coding is not necessary." Flow-Matic is not represented as a replacement for good systems design and careful run analysis.

General Information

AN AUTOMATION TIMETABLE

Alvin J. Vogel, Central National Bank, Chicago.
BANKING, September 1958; pages 70-75.

This is a discussion of some of the more serious questions on conversion to automatic methods by banks.

Availability versus usability

A timetable is given on automation equipment for banks, as estimated by a number of equipment manufacturers. The author found, however, that "while much equipment is now available, it is not usable at this time, because most of this equipment is designed for paper check input based on magnetic ink characters." (See below: "First Sorter for Bank Automation System Shipped.")

There are many problems to be solved before magnetic character check processing can begin. Among these are design of account numbers by the banks, issuing of account numbered checks and deposit slips, and acceptance of the new method by at least 90 to 95% of the customers. Also, there is the problem of who pays the cost of the pre-printed checks, the banks or the customers. Redesign of checks to accommodate the printing also takes time. Moreover, actual testing of the selected type face has yet to be done. In addition, there is some question as to the tolerances required for the printing job. This will influence the ability of banks to print their own checks. It appears that it will be 1960 before banks will convert to the full use of magnetic checks, and 1961 before we will see expansion of installations of complete electronic demand accounting through paper check input.

"The estimated timetable for the use of magnetic imprinted checks as a direct input is as follows:

Account coding conversion

1958 will see the completion of field testing of magnetic ink imprinted checks by both the printers and the manufacturers. 1959 will be needed by the printers to retool and redesign checks and establish costs. 1959 will also be the year that banks will be setting up a code system for their accounts. 1960 will be the year of reconversion to the full use of magnetic checks and in many cases it will take some banks into 1961. 1961 will see expansion of installations of complete electronic demand accounting through the use of paper check input."

Banks which contemplate the use of the semi-automatic bookkeeping machines, as well as those planning to install large systems should begin now to plan their coding systems. The author surveyed the following companies for availability of bank automation equipment: IBM, Underwood, National Cash Register, Remington Rand, Burroughs, and Datamatic.

FIRST SORTER FOR BANK AUTOMATION SYSTEM SHIPPED

JOURNAL OF MACHINE ACCOUNTING, August 1958; page 42.

The first production model of a sorter developed by Pitney-Bowes, Inc. and The National Cash Register Company has been shipped for use with the Bank of America's ERMA. The sorter reads magnetic characters printed on checks and deposit slips and sorts them at a speed of 750 items a minute. It can process intermixed documents of varying length, width and thickness, including punched cards and mutilated items.

CUTTING THE COST OF YOUR EDP INSTALLATION

Canning, Sisson and Associates, 1958. \$55.

A special report has been published by this consulting firm which gives detailed and specific information on the procedures involved in installing an electronic data processing system. The report covers such subjects as: 1. Selecting a site; 2. Managing the program; 3. A detailed discussion of technical factors such as: Air conditioning requirements, Dust control, Fire protection, Protection of magnetic tapes, False floors; 4. Survey of a number of operating installations; good solutions to problems and what they would do differently next time.

Detailed check lists and procedures are presented, as an aid in making the necessary decisions. For information, write: Canning, Sisson and Associates, 1140 South Robertson Boulevard, Los Angeles 35, California.

SURVEY OF COMPUTING SERVICES

COMPUTERS AND AUTOMATION, July 1958; pages 10-12.

Condensed information on 31 organizations offering computing services is given. These organizations include commercial bureaus, private research organizations, consulting firms, and universities. Both business and scientific services are included.

ELECTRONIC DATA PROCESSING

NAVY MANAGEMENT REVIEW, August 1958; entire issue.

The entire issue is given to brief descriptions of the various electronic data processing programs being operated or planned by the various branches of the Navy Department. A chart shows the growth of EDP in the Navy, with a total of 29 systems in 1957 and a total of 72 planned by 1959.

**PROCEEDINGS, EXECUTIVE CONFERENCE ON ORGANIZING AND MANAGING
INFORMATION**

University College, The University of Chicago. 1958. \$3.00.

The second annual conference of business executives and librarians explored the information needs of business and the way in which librarians can help supply the information needed. The most intriguing proposition was contained in the opening talk by Professor Harold J. Leavitt, Carnegie Tech, and Professor Thomas L. Whisler, University of Chicago. This proposition was that business faces the imminent prospect of re-centralization, with a consequent down-grading of middle management, and the upgrading of technical and scientific personnel. This will be brought about by the replacement of "scientific management" and "participative management" with "information technology," a descriptive term which includes operations research, computer technology, game theory and communications networks theory. Top echelons will consist of "top management innovators and planners.... Long-hairs and Ph.D.'s will be moving into industry increasingly, and at a fairly high level.... The technicians and the researchers will have a clearer road to the presidency than the junior line executive." For information on obtaining a copy of the proceedings, write to: University College, University of Chicago, 64 East Lake Street, Chicago 1, Illinois.

BASICS OF DIGITAL COMPUTERS

*John S. Murphy, Burroughs Corporation
John F. Rider Publisher, Inc., 1958. \$7.95.*

A course developed over four years for instructing computer technicians has been published in book form, either in one-volume hard cover form, or in three pocket-book size volumes (\$2.50 each). Volume one, or the first section of the book, will be of value to any person unacquainted with the workings of electronic digital computers. The other two sections are technical, and include such subjects as logic block diagrams, circuitry, magnetic cores, timing pulses, recording, and similar matters relating to the technical aspects of computers.

The volumes are copiously illustrated with pictures and diagrams, done in a cartoon style which get the point across in a most direct manner. These are first-rate educational materials. They appear to be usable in high school or junior college courses, as well as in training courses for electronic technicians being prepared for production or maintenance work on computers.

JOINT COMPUTER RESEARCH

A. H. Forman, Jr., Arizona Public Service Company
SYSTEMS MAGAZINE, July-August, 1958; pages 15, 16.

A research program is being carried on by representatives from Arizona Public Service, American and Foreign Power Company, Remington Rand, and Ebasco Services, Inc. to investigate the feasibility of using an electronic computer in the utility industry for both business and engineering problems. Two major areas of problems were defined: budgeting and forecasting with emphasis on the exercise of budgetary controls; and system operating problems involving interchange between interconnected systems, and the planning of economical system expansion to meet anticipated load growth.

"The objective of the research staff has been to design programs broad enough to be generally adaptable for use in any utility's operations. As work on projects is completed, formal reports for the use of sponsoring companies will be prepared...in two parts: a project analysis and discussion, and a project tape manual."

ELECTRONIC DEVICE SIMULATES PROCESSES OF HUMAN BRAIN

AVIATION WEEK, July 7, 1958; pages 60-63, 67-71.

DESIGN OF THE PERCEPTRON

DATAMATION, July-August 1958; pages 5-9.

A machine called a "Perceptron" has been developed by Dr. Frank Rosenblatt of the Cornell Aeronautical Laboratory under the sponsorship of the Office of Naval Research. The machine has been shown capable of teaching itself the difference between several letters of the alphabet, and can "learn" responses to patterns placed consistently in certain spots within its field of vision. The memory cells of the Perceptron's "brain" are wired together randomly. The machine sees its environment through a lens which focuses an image and a "retina" of photoelectric cells. The signal from the cells passes randomly through a portion of the memory cells as it reaches the response units. These memory cells are strengthened and their future output signals tend to dominate the output of the other memory cells. Thus, the machine appears to "learn" the proper response to the stimulus. Rosenblatt believes that future computers will be designed to combine features of both the Perceptron and the digital machines.

Applications

7 WEEKS LATER...

E. R. Parker, Associated Grocers, Phoenix, Arizona
SYSTEMS MAGAZINE, July-August, 1958; pages 8, 9.

*Computer reveals
lost business*

Associated Grocers has installed a Univac File Computer to keep up with its growing inventory control problem. The system was cut-over February 1, 1958 to full operation on inventory and billing, and in seven weeks time was working smoothly. Valuable information was obtained from the very beginning. During the second week of operation the system revealed that the cost of missed business because of outs was over \$11,000 in one day. After six weeks this dropped two-thirds. The system works in this manner:

"Once each week, currently on Wednesday, a buyer's report shows the amount of stock on hand, amount on order, last four weeks sales by individual weeks, and a total column of the four weeks.

"The report takes less than three hours time to prepare from the time it is started until delivery to the buyers. Another column has recently been added: the computer evaluates the sales, stock on hand, amount on order, and prints the amount necessary to bring the total stock on hand and on order up to an amount equal to five weeks sales, based on the current figures.

"As the buyers scan the report, they mark in a special column the amount of each item they wish to order. These are then punched -- the item number and amount ordered -- in a card for each item. In a pass through the computer, the amount ordered is entered in drum storage, and the pack, size, description, and vendor number are punched in each card. These cards are then sorted to vendor number, collated with vendor header cards, and a purchase order printed from them. One copy goes to the warehouse receiving department. When that particular lot of merchandise is received, the amount is entered on the purchase order copy and sent to a receiving card file clerk.

*Inventory control results
from purchase orders*

"Here the original purchase order card is pulled and matched with the receiving copy. The amount received and date received are punched in the item card, and the card is sent back through the computer. During this run, the original amount ordered is subtracted from the on-order quantity, and the actual amount received is added to the on-hand quantity. At the same time, the computer enters the cost and extends it in each item card. This amount is later used in accounting for the dollar value of our warehouse inventory."

The billing operation formerly took 17 people on two-and-a-half shifts six days a week to bill about 70,000 lines. Now, the computer is enabling the company to bill about 85,000 lines a week on one shift with nine people. A complete inventory report can be prepared in a little under two hours.

Automated buying

The system includes some automatic buying. "This is done by setting certain minimums on about 500 items at first, and adding more in the future. When the on-hand, plus on-order, amount is down to this minimum figure, a card is punched out by the computer and a pre-determined amount ordered. All the buyer does is sign the purchase order."

The firm figures it "could probably do about 25 percent more business without increasing office costs."

A SMALL ELECTRONIC COMPUTER APPLIED IN A RETAIL DEPARTMENT STORE

C. Fred Flannell, Royal McBee Corp., Port Chester, N. Y.
COMPUTERS AND AUTOMATION, August 1958; pages 8-12.

Burdine's Department Store in Miami, Florida, is using an LGP-30 to process data on retail sales in its newest Miami branch. This store is expected to do about five million dollars in business per year, involving two to four thousand transactions per day.

*Paper tape input
for retail store*

Point-of-sale paper-tape-producing cash registers eliminate the hand-written sales ticket, and produce the paper tape needed for data processing. Data produced by the cash registers on the tape include: department number, class of merchandise, number of items involved, and price. After a sub-total is taken, the sales clerk enters any special charges with the identifying code. Deposits on lay-aways and employee discounts are entered as negative prices. Sales clerk number and type-of-sale code is entered. Striking the End-of-Transaction bar records this information, plus store number, register number and transaction number. A void key is provided to void mistakes. The tapes are read into the computer backwards so that any void code enters first and the computer skips that transaction.

Sample reports issued by the computer are shown in the article. They include: error reports (on the day's transactions); cash report for all registers; report by type of sale; report on salesperson performance sorted by department and clock numbers; analysis by department, analysis of sales by class of merchandise within each department. More totals are held than the number of memory locations available. But the totals do not require 9 digits of magnitude, so two units of data may be stored in one memory location and separated by the program for processing. This in-

creases the size of the memory from 4096 locations to 8192 locations. In the beginning, processing required two to five hours. This has now been cut considerably by improving the program.

A CASE STUDY IN COMMERCIAL ELECTRONIC DATA PROCESSING

D. S. Greensmith and J. G. Thompson, Boots Pure Drug Co. Ltd., London, England.
THE COMPUTER BULLETIN, June-July, 1958; pages 12-16.

*From centralized manual
operations to computer*

Boots Pure Drug Company Limited started to examine the possibility of using a computer in 1953-54. The company's turnover had expanded consistently, the highly centralized offices were not extensively mechanized, and there was reason to hope that capital expenditure, which in turn had been devoted to research, production, distribution, and retail branches, could be devoted to the development of the office function. The company employs more than 38,000 people, 2000 of whom are in the centralized clerical function. There is a total of 60,000 items, and each year the company makes about 380 million unit sales.

The EDP team is responsible to the Finance Director. It is headed by the General Office Manager and includes O. and M. personnel. A committee of reference representing Buying, Accounting, Distribution and Retail, has been continuously consulted.

Retail branches place orders on the warehouse every two weeks, in a staggered sequence. There are 7000 potential cash register positions in the retail branches, with only 1000 equipped at the present time. Hand-written sales slips are used elsewhere.

The investigating team decided that, although a number of clearly defined tasks could be put on a computer, "truly integrated applications were likely to be more fruitful." A small computer was ordered for gaining experience through payroll applications, but was cancelled. Early in 1956 an order was placed for an Underwood ELECOM, and progress had been made in programming for this machine when Underwood announced it would not be making any more large-scale computer systems. Eventually, the British EMIDEC was selected.

"Ideally, in a business similar to Boots, ... true integration can be achieved by capturing a mechanical record of every transaction at the point of sale and using this record to give sales analysis, cash control, stock control, production control, etc. Human and organizational rather than mechanization problems make it difficult of achievement in the immediate future. It remains the Company's long-term aim."

Having this aim in mind, the company began at the point where the branches order goods from the warehouses. Experi-

Automatic order input is goal

ments are being made toward automatic input of orders. "The aim is to produce mechanically the delivery notes, a record for each branch manager of the goods received at the branch, a simple account for stock control for each branch and for the warehouses, and records for buyers to place and follow up orders... Buying Offices will first be given full records of stock movement plus a warning when stock falls below a given level. It is hoped this will give them confidence in the system and that later they will agree to receive tabulations only of items requiring attention, together with statistics showing how the demand of branches is varying so that future purchases can be planned."

Some of the figures on the merchandise accounting application are given:

Input:	70,000,000 items ordered per year
	Peak load 300,000 per day
	Characters per item: 4 letters + 1 to 3 figures
	Characters per day: 2,100,000
Main output:	One printed line per item: 300,000 lines
	Document headings: <u>50,000</u> lines
	Lines of print per day: 350,000 lines
	Characters and spaces per line: 60
Subsidiary output:	Alphanumeric Exception Reports
Storage:	Items in Inventory: 60,000
	Items per Department for processing: 1000 to 12,000
	Decimal digits per item: 100
Timing:	Order processing: daily
	Branch accounts: monthly
	Reports: out of stock: daily; critical stock level: daily; appropriations: weekly; re-order: daily

EMIDEC was chosen

The system needed to have magnetic tape as well as extensive internal storage because of the great amount of sorting necessary. The system was designed, also, to cover future expansion of the business. Boots examined thirty-one systems in the United States and Great Britain, before choosing the EMIDEC. This

choice was made because of the price, the multichannel input and output, magnetic and punched paper tape facilities, massive high speed internal storage and high speed printed output. It also included automatic conversion of decimals and sterling to binary. The double buffers for additional speed of input and output were also attractive.

About fifteen people are engaged in the investigation, programing and organizational work. Systems investigators work in teams of three. Programing and processing people have worked with the methods people throughout. A pilot scheme has been devised to test out various aspects of the new methods. Some interesting facts have emerged from the programing activity:

Paper tape is fast enough for input

Despite the vast volume of daily input, punched paper tape has proved to be fast enough. The high speed core memory is not large enough for sorting the biggest orders which must, therefore, be dealt with in parts. A massive magnetic tape record would be necessary to give details of issues of each commodity for each of the last ten days if moving totals are to be calculated for the detection of critical stock levels. As in many other installations, methods and programing work was under-estimated.

However, the company is convinced that EDP has much to offer. The earning capacity of such a system is more important than its ability to produce savings. Boots has recognized that much development work is needed in equipment, and has financed a research project at a University and with a commercial organization. The company has ordered a Solartron Electronic Reading Automaton to be coupled to a special Elliott-built computer for the preparation of sales analyses and cash control information.

The total investment will be in the region of 250,000 pounds, not including the 7000 cash registers to be added eventually. Maintenance will be done by Boots after the first year.

TAPE TACKLES TALL ORDER

CHEMICAL WEEK, August 23, 1958; pages 57, 58.

National Distillers & Chemical Corporation has installed a leased-wire Teletype system connecting 40 plants, shipping points, sales offices and company headquarters. The system is used as a communication network to handle, via punched paper tape, production scheduling, invoicing and order processing, sales and production statistics, budget and inventory control statistics. Programing is now in process for handling employee wage-check make-up on an electronic computer in the New York headquarters.

Equipment

READING THE HIGH SPEED PRINTERS

DATAMATION, July-August, 1958; pages 18-20.

The technical characteristics of six high speed printers are given in brief paragraphs. They include Analex, Datamatic, Remington-Rand, NCR, Stromberg-Carlson, and IBM. The latter is actually not a printer, but a cathode-tube visual reading device.

CATALOG OF INTEGRATED DATA PROCESSING EQUIPMENT

OFFICE EQUIPMENT NEWS, August 1958; pages 26-33.

The equipment of twenty-five companies is listed along with information on input and output, speed, and availability. The equipment includes only peripheral or small IDP units, not central computing systems.

IBM 7070

IBM has announced availability of the 7070, a transistorized computer in the medium price field. Because of the transistor design, one third is cut from installation and environmental costs. Time is saved by the overlapping of machine operations; information may be read from or written on magnetic tapes while the machine is computing. It can also handle several high speed card readers and punches simultaneously. Four 50-disk files may be included in the system. In addition, there is a high speed core memory of 50,000 to 100,000 digits. A library of programs is offered as part of the system.

Training

How to Use Electronic Data Processing for Production Planning and Inventory Control

Date: October 20-24, 1958
Place: Chicago, Illinois (The Chicago Club)
Fee: \$385
Information: Management Science Training Institute
40 Wall Street, New York 5, New York

Management Concepts in Operations Research

Date: October 27-31, 1958
Place: Boston, Massachusetts (The Harvard Club)
Information: Harvey N. Shycon Company, Park Square Building,
Boston, Massachusetts

Engineering and Management Course

Date: January 26 - February 5, 1959
Place: University of California at Los Angeles
Information: R. R. Cole, College of Engineering,
Room 3104, University of California,
Los Angeles 24, California

COLLEGE COURSES

University of Pennsylvania, The Moore School of Electrical Engineering

EE 523 Introduction to Digital Computing Machines
EE 634 Applications of Large-Scale Digital Computers to
Business and Industrial Systems
EE 667 Linear Programing and an Introduction to the Theory of Games

Also, courses in programing for engineering problems and computer design. For information, write: Director, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia 4, Pa.

Rutgers, The State University

The Computation Center offers one-year courses in Numerical Analysis and programing at the senior-graduate level, with a prerequisite of mathematics through differential equations. Seminars in Numerical Analysis are conducted in accordance with student demand. Extension Division courses in EDP: Application of Electronics to Office Systems and Procedures, Principles of Programing Electronic Computers.

For information on regular courses, write: Registrar, Rutgers, The State University, New Brunswick, New Jersey. For information on Extension Courses, write: University Extension Division, Rutgers, The State University, New Brunswick, New Jersey.

Meetings

Operations Research Society of America National Meeting

Date: October 23, 24, 1958

Place: St. Louis, Missouri (Statler Hotel)

Fifth Annual Computer Applications Symposium, Armour Research Foundation

Date: October 29, 30, 1958

Place: Chicago Illinois (Morrison Hotel)

Information: Armour Research Foundation 10 West 35th Street,
Chicago 16, Illinois

Fourth Electronic Business Systems Conference, sponsored by Western Division of NMAA

Date: October 30, 31, 1958

Place: Seattle, Washington (Olympic Hotel)

Information: E.B.S. Conference, National Machine Accountants Assoc.,
Western Division, P.O. Box 134, Seattle 11, Washington

Fifth Institute on Electronics in Management -- "Current Developments in Automatic Data Processing Systems"

Date: November 3-7, 1958

Place: American University, Washington, D.C.

Information: Lowell H. Hattery, Director, Institute on
Electronics in Management, American University,
1901 F Street N.W., Washington 6, D.C.

International Conference on Scientific Information

Date: November 16-21, 1958

Place: Washington, D.C. (Mayflower Hotel)

Information: Secretariate, International Conference on Scientific Information,
National Academy of Sciences, 2101 Constitution Avenue, N.W.,
Washington 25, D.C.

National Physical Laboratory Symposium and Electronic Computer Exhibition

Date: November 28 - December 4, 1958

Place: London, England

Information: C. V. Wattenbach, Deputy Managing Director, Dictograph
Telephones, Ltd., London, England

Eastern Joint Computer Conference

Date: December 3-5, 1958

Place: Philadelphia, Pennsylvania (Bellevue Stratford Hotel)

Information: Mr. P. Raffa, Technitrol Engineering Co.,
1952 E. Allegheny Ave., Philadelphia 24, Pa.

Western Joint Computer Conference

Date: March 3-5, 1959

Place: San Francisco, California (Fairmont Hotel)

Theme: "New Horizons with Computer Technology"

Information: WJCC, Box 381, Station A, Palo Alto, California

International Conference on Information Processing

Date: June 15-20, 1959

Place: Paris, France

Information: U.S. Committee for the First International Conference on Information Processing, Box 4999, Washington 8, D.C.

1959 ACM National Conference

Date: Summer, 1959

Place: M.I. T.

Information: F. Verzuh, Massachusetts Institute of Technology, Cambridge, Mass.

SHARED PROGRAMING GROUP

ALWAC Users Association - November 12, 14, 1958, at the
ALWAC Plant in Hawthorne, California.

A SPECIAL MESSAGE TO OUR SUBSCRIBERS:

DATA PROCESSING DIGEST has been published for the past three and one half years as a service of the consulting firm of Canning, Sisson and Associates. This month, the publishing of DPD and other publications in the EDP field becomes the primary function of Canning, Sisson and Associates. Both Richard G. Canning and Roger L. Sisson continue in their advisory and policy-making capacities. In addition, Mr. Canning will be concerned with administration and technical content.

Mr. Sisson has accepted a challenging position with Aero-nutronic Systems, Inc., a subsidiary of the Ford Motor Company. In his new position, Mr. Sisson will be a manager on a major military data processing development contract.

The consulting services, training courses, and related activities of Canning, Sisson and Associates will be continued by Mr. Canning under his own name.

References

The publishers of books and periodicals mentioned in this issue of DATA PROCESSING DIGEST are listed below for your convenience in writing for more complete information.

Automation
Penton Publishing Co.
Penton Building
Cleveland 13, Ohio

Banking
12 East 36th Street
New York 16, New York

Chemical Week
330 West 42nd Street
New York 36, New York

The Computer Bulletin
The British Computer Society Ltd.
Finsbury Court, Finsbury Pavement
London EC 2, England

Computers and Automation
815 Washington Street
Newtonville 60, Mass.

Computing News
12805 - 64th Ave. South
Seattle 88, Washington

DataMation
10373 W. Pico Boulevard
Los Angeles 64, California

Journal of Industrial Engineering
145 North High Street
Columbus 15, Ohio

Journal of Machine Accounting
Systems and Management
208 South Main Street
Paris, Illinois

Office Equipment News
146 Bates Road
Montreal 8, Canada

Navy Management Review
Supt. of Documents
U.S. Government Printing Office
Washington 25, D. C.

John F. Rider Publisher, Inc.
116 West 14th Street
New York 11, New York

Systems
Remington Rand Univac
315 Fourth Avenue
New York 10, New York

Univac Review
(see Systems)

Resource

The following periodicals are reviewed regularly by the publishers of DATA PROCESSING DIGEST for significant information in the data processing and related fields.

The Accountant (England)	Industrial Quality Control
Accounting Review	Instrument Society of America Journal
Advanced Management	Instruments and Automation
Aerospace Engineering Review	Internal Auditor
A.I.E.E. Review	International Technical Titles
American Business	Interpreter
American City	Iota Computer Bibliography (England)
American Documentation	I.R.E. Proceedings
American Gas Association Monthly	I.R.E. Transactions
Armed Forces Management	Journal of Accountancy
Auditgram	Journal of Association for Computing Machinery
Automatic Control	Journal of Documentation (England)
Automatic Office	Journal of the Franklin Institute
Automation	Journal of Industrial Engineering
Automation Consultants	Journal of Institution of Production Engineers (England)
Automation Progress (England)	Journal of Machine Accounting
Automation and Remote Control (USSR)	Journal of Research and Development (IBM Corp.)
Banking	Journal of Society for Industrial and Applied Mathematics
Behavioral Science	Life Association News
Bell Laboratories Record	Machine Accounting and Data Processing
Best's Insurance News	Machine Design
Burrough's Clearing House	Management Methods
Business (England)	Management Science
Business Topics	Mechanical Translation
Business Week	Merchants Trade Journal
Chain Store Age (Adm. Edition)	Modern Office Procedures
Challenge	Modern Railroads
Chemical Week	N.A.A. Bulletin
Communications of A.C.M.	Navy Management Review
Computer Bulletin (England)	O & M Bulletin (England)
Computer Journal (England)	The Office
Computers and Automation	Office Appliances
Computing News	Office Equipment News (Canada)
Consulting Engineer	Office Executive
Contractors and Engineers	Office Management
Control Engineering	Operational Research Quarterly (England)
The Controller	Operations Research (ORSA)
Cost and Management (Canada)	Paperwork Simplification
Credit Executive	Product Engineering
Credit and Financial Management	Production
Credit World	Publishers Weekly
Current Contents	Railway Age
Data	Regelungstechnik (Germany)
DataMation	Research for Industry (Stanford Research Institute)
Data Processor	The Spectator
Department Store Economist	Stanford Research Journal
Dun's Review	Stores
Electrical Engineering	Systems and Procedures Quarterly
Electronic Design	Systems Magazine
Electronics	Technical News Bulletin
Engineering News Record	Tooling and Production
The Executive	United States Investor
Factory Management and Maintenance	U.S. News and World Report
Forbes	Univac Review
Harvard Business Review	Western Electronic News

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